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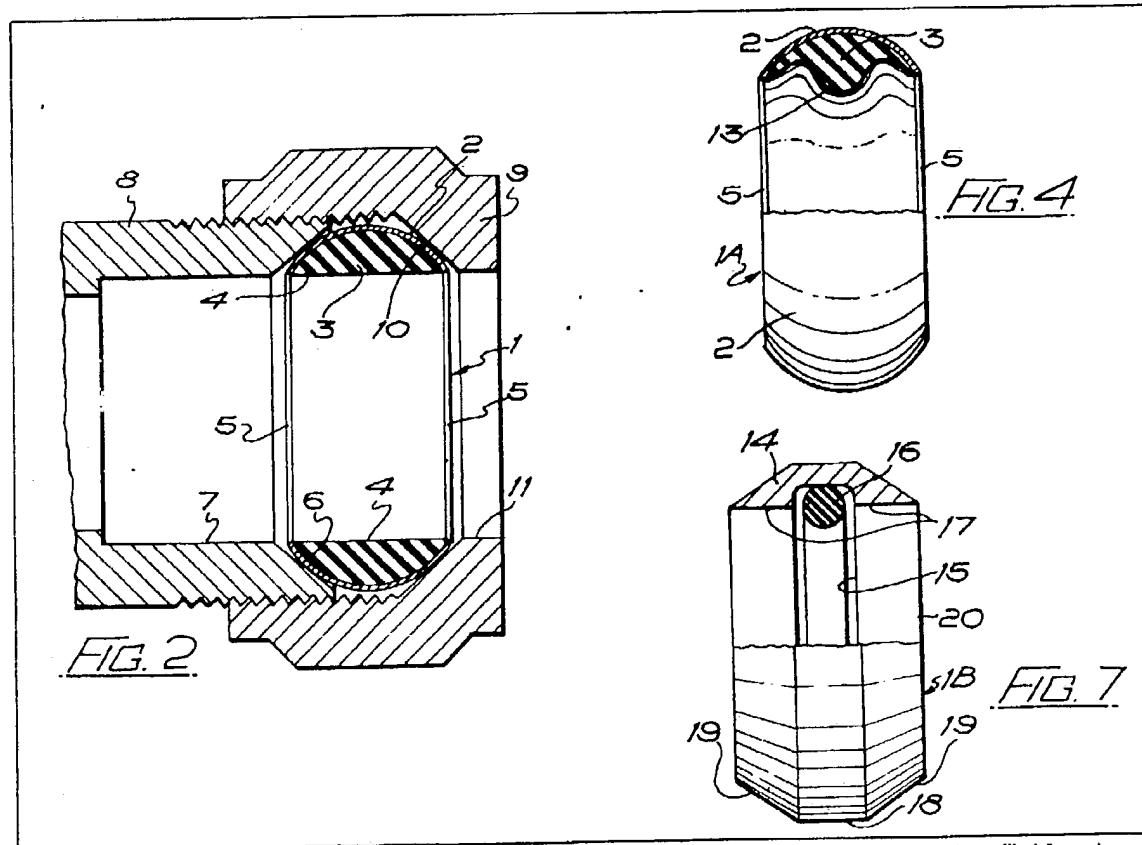
Sheffield S1 1ZZ

(54) Pipe couplings

(57) Means enabling a plastics pipe

(12) to be used with a compression coupling or fitting (8) comprises a sealing member (1 or 1A or 1B) consisting of a deformable outer ring (2 or 14) and an inner elastomeric ring (3 or 16), with the outer ring initially shaped to form an axial cross-section concave towards the axis, and with the inner ring extending inwards at least as far but pref-

erably beyond the projected surface of revolution (4) between the rims (5 or 20) of the outer ring. The inner ring (3) may line the outer ring (2) and have a central lip (13) or lips only extending beyond the surface of revolution (4), or it may be an O-ring (16) housed in a groove (15) in the outer ring (14). A rigid support sleeve may be inserted into the plastics pipe end before insertion into the pipe coupling or fitting.



The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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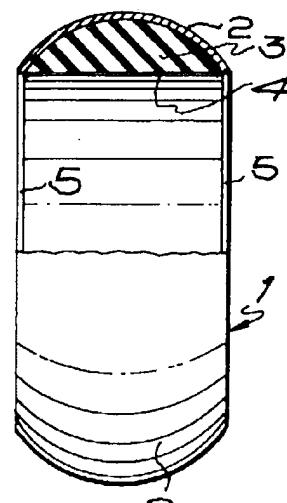


FIG. 1

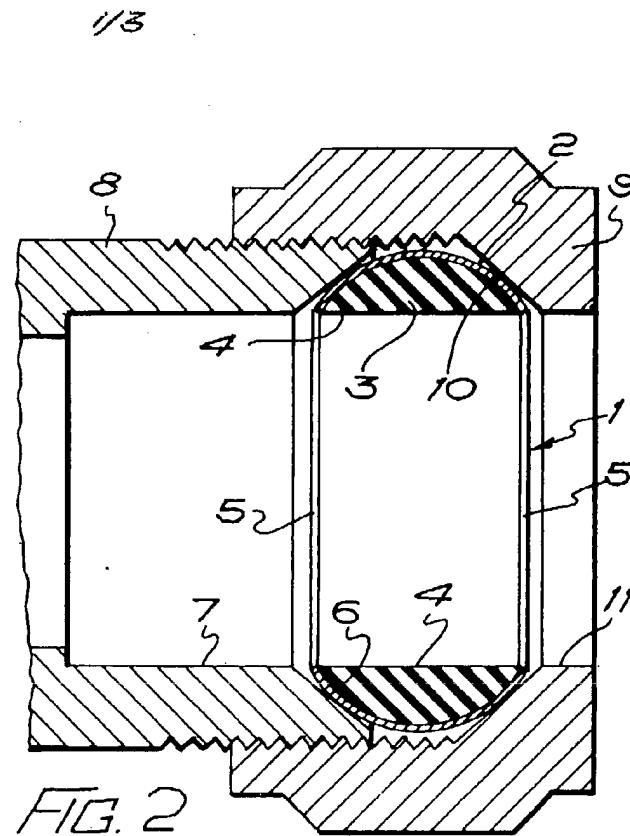


FIG. 2

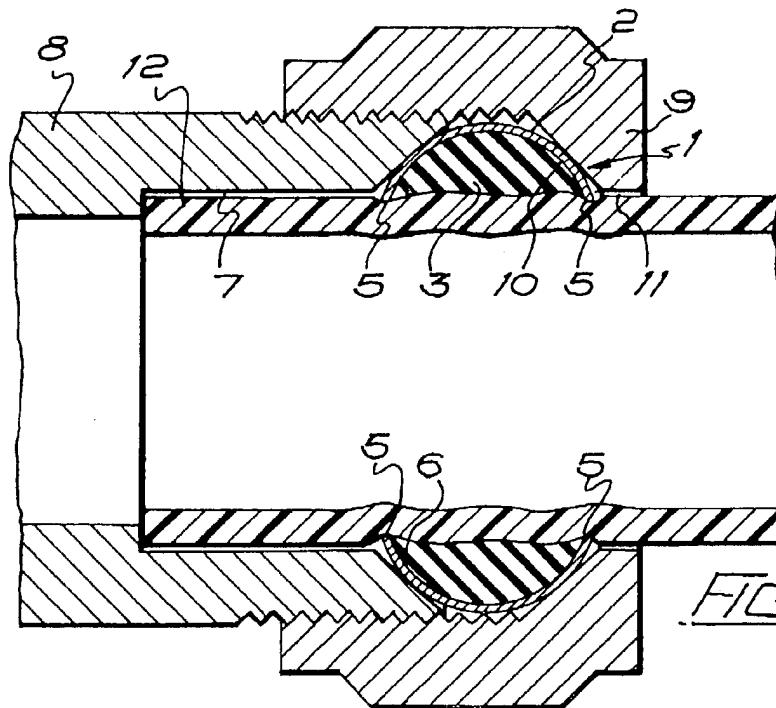


FIG. 3

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2/3

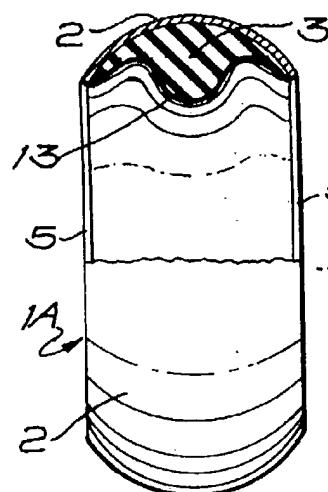


FIG. 4

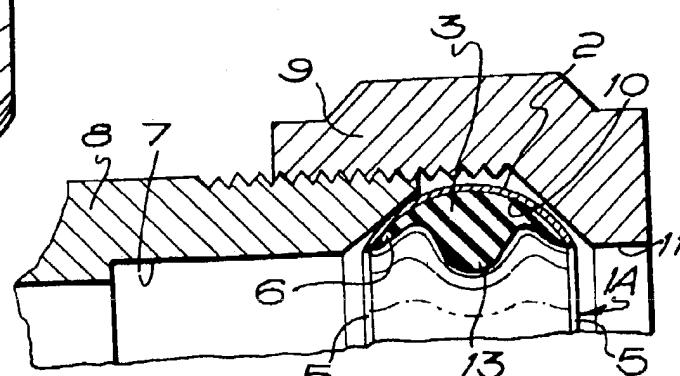


FIG. 5

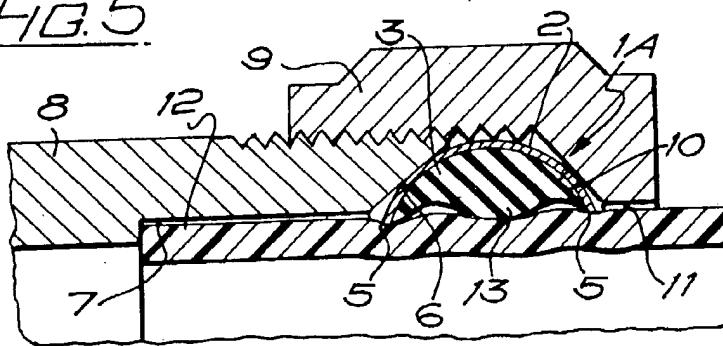


FIG. 6

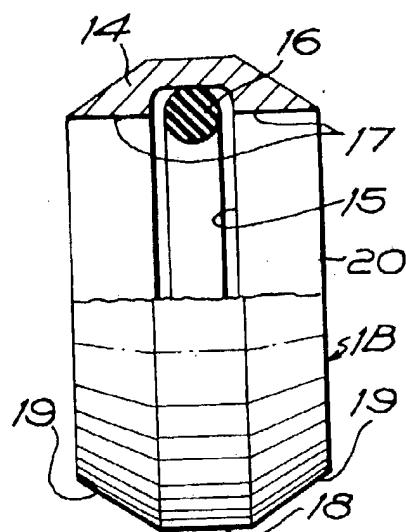


FIG. 7

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3/3

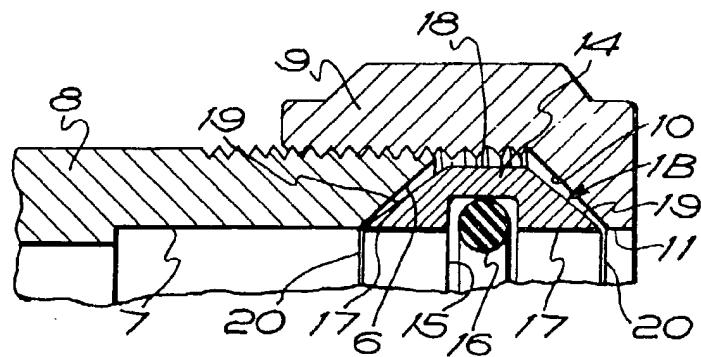


FIG. 8

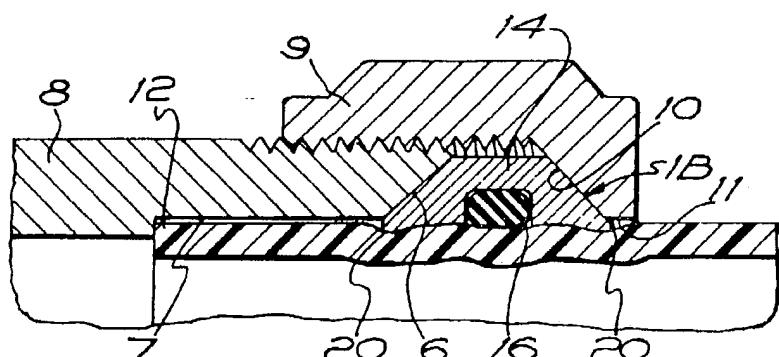


FIG. 9

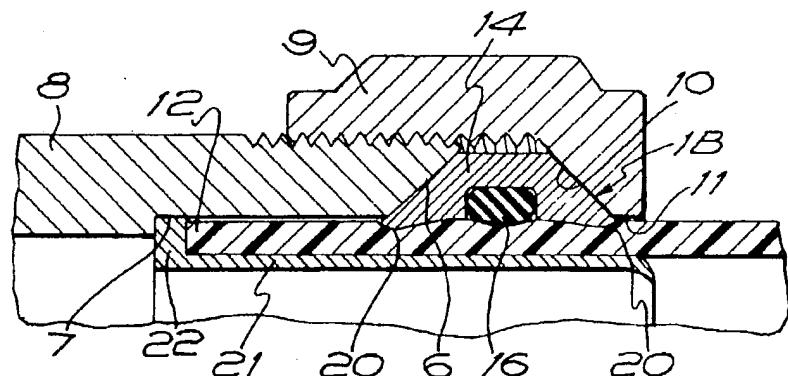


FIG. 10

**SPECIFICATION****Pipe couplings**

5 This invention relates to pipe couplings and fittings more particularly of the type normally using compression joints in which a tapered ferrule or "olive" on a metal pipe is forced axially by a compression nut into a tapered 10 mouth of a socket in a coupling or fitting, whereby the ferrule or "olive" is compressed radially to grip the pipe and seal both round the pipe and in the socket.

Plastics pipes are being used increasingly in 15 place of metal ones, but the stress relaxation encountered with plastics pipes when under continuously applied load and fluctuations in temperature make them impractical for long term use with compression joints.

20 The object of the present invention is to provide means enabling plastics pipes to be used with existing couplings and fittings normally using compression joints.

According to the present invention, means 25 enabling a plastics pipe to be used with a coupling or fitting normally using a compression joint comprises a sealing member consisting of a deformable outer ring and an inner elastomeric ring component, with the outer 30 ring component initially shaped to form an axial cross-section concave towards the axis of the ring, and with the elastomeric ring component extending radially inwards from the outer ring component at least at its radial mid-plane 35 at least as far as but preferably beyond the projected surface of revolution between the rims of the deformable outer ring component, which rims have an internal diameter not less than the outside diameter of the plastics pipe.

40 When the sealing member is interposed between the compression nut and the socket of a compression joint type coupling or fitting (in place of the usual ferrule or "olive") with one rim of the outer ring component entering 45 the tapered mouth of the socket, and a plastics pipe end is inserted through the compression nut, through the sealing member, and into the socket, tightening of the compression nut causes it to push against the rim of the 50 outer ring component remote from the socket (or the outer surface of the outer ring component adjacent the rim remote from the socket), whereby the outer ring component is deformed and the rim within the mouth of the 55 socket is compressed radially to grip the pipe. The elastomeric ring component effects sealing around the plastics pipe by virtue of being distorted radially inwards by the deformation of the outer ring component and/or by virtue 60 of the elastomeric ring component being initially an interference fit on the pipe. The outer surface of the outer ring component adjacent the rim within the mouth of the socket is pressed into intimate contact with the mouth 65 of the socket and therefore effects sealing

therewith.

The deformable outer ring component is preferably symmetrical about its radial mid-plane, so that either rim can be inserted into 70 the tapered mouth of the socket in a coupling or fitting.

The deformable outer ring component may be formed of metal, preferably copper or other ductile metal, or of rigid plastics material and 75 the inner elastomeric ring component may fill the space between the inside surface of the metal or rigid plastics ring and the projected surface of revolution between its rims, or the inner elastomeric ring component may line the 80 inside surface of the metal or rigid plastics ring and have a central lip or lips only extending radially inwards beyond the projected surface of revolution between the rims of the metal or rigid plastics ring. The inner elastomeric ring component may be bonded to the 85 inside surface of the metal or rigid plastics ring (e.g., effected when moulding the elastomeric component in situ in the metal or rigid plastics ring) and is preferably formed of 90 peroxide cured ethylene propylene diene methylene or ethylene propylene terpolymer, or silicone rubber.

Alternatively, the deformable outer ring component may be formed of metal or rigid 95 plastics material having an inwardly facing groove forming a housing for the inner elastomeric ring component, which may be a rubber O-ring. The groove is preferably between two cylindrical surfaces, and the outer 100 side of the outer ring component is preferably a short central cylindrical surface between the larger diameter ends of a pair of opposed frusto-conical surfaces.

Three embodiments of the invention will 105 now be described, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 is a half sectional elevation of one 110 form of sealing member in accordance with the invention;

Figure 2 is an axial section of a compression joint of a pipe coupling or fitting provided with a sealing member of the form shown in Fig. 1;

115 Figure 3 corresponds to Fig. 2 but shows a plastics pipe end inserted into the coupling or fitting and gripped and sealed by the sealing member which has been deformed by tightening of the compression nut;

120 Figure 4 corresponds to Fig. 1 but shows another form of sealing member in accordance with the invention;

Figures 5 and 6 correspond to the upper parts of Figs. 2 and 3 respectively but using 125 the form sealing member shown in Fig. 4;

Figures 7 to 9 correspond to Figs. 4 to 6 respectively but show a further form of sealing member in accordance with the invention; and

Figure 10 corresponds to Fig. 9 but shows 130 a rigid support sleeve inserted in the plastics

pipe end.

Fig. 1 shows a sealing member 1 consisting of a deformable outer ring component 2 and an inner elastomeric ring component 3, with the outer ring component 2 formed of sheet metal, e.g., copper or other ductile metal, with an axial cross-section concave towards the axis of the ring, and with the elastomeric ring component 3 of, for example peroxide cured ethylene propylene diene methylene or ethylene propylene terpolymer, moulded in situ in the metal ring 2 so as to bonded thereto and extending radially inwards as far as the projected surface of revolution 4 between the rims 5 of the sheet metal ring. The deformable outer sheet metal ring component 2 is symmetrical about its radial mid-plane, so that either rim 5 can be inserted into a tapered mouth 6 (Fig. 2) of a socket 7 in a pipe coupling or fitting 8, which has a compression nut 9 with a tapered bearing surface 10. The rims 5 have an internal diameter substantially equal to the internal diameter of the socket 7 and of the entry 11 of the compression nut 9, which internal diameter is slightly greater than the external diameter of a plastics pipe end 12 (Fig. 3) inserted through the compression nut 9, through the sealing member 1, and into the socket 7. Tightening of the compression nut 9 on to the pipe coupling or fitting 8 causes the nut to push against the outer surface of the outer ring component 2 adjacent the rim 5 remote from the socket from the socket 7, whereby the outer ring component is deformed and the rim 5 within the mouth 6 of the socket is compressed radially to grip the pipe 12. The elastomeric ring component 3 effects sealing around the plastics pipe by virtue of being distorted radially inwards by the deformation of the outer ring component 2. The outer surface of the outer ring component adjacent the rim 5 within the mouth 6 of the socket 7 is pressed into intimate contact with the mouth of the socket and therefore effects sealing therewith. Because of the taper of the bearing surface 10 of the compression nut 9, the rim 5 remote from the socket 7 is also compressed radially to grip the pipe 12.

The sealing member 1A of Figs. 4 to 6 is basically similar to the sealing member 1 of Figs. 1 to 3 in that it has the same sheet metal deformable outer ring component 2 and an elastomeric inner ring component 3 moulded therein, but the component 3 lines the inside surface of the component 2 and has a central lip 13 only extending radially inwards beyond the projected surface of revolution between the rims 5 of the metal ring.

Thus the elastomeric ring component 3 effects sealing around the plastics pipe 12 by virtue of the lip 13 being initially an interference fit on the pipe.

The sealing member 1B of Figs. 7 to 10 has the deformable outer ring component 14

formed of ductile metal (or rigid plastics material) having an inwardly facing groove 15 forming a housing for the inner elastomeric ring component 16, which is a rubber O-ring.

- 70 The groove 15 is between two cylindrical surfaces 17 having an internal diameter substantially the same as the internal diameter of the socket 7 in the pipe coupling or fitting 8 and of the entry 11 of the compression nut 9.
- 75 The outside of the outer ring component 14 is a short central cylindrical surface 18 between the larger diameter ends of a pair of opposed frusto-conical surfaces 19, the cone angles of which are slightly less than the cone angles of
- 80 the tapered mouth 6 of the socket 7 and of the bearing surface 10 of the compression nut 9, so that the rims 20 of the outer ring component 14 bite into the inserted plastics pipe end 12.
- 85 In Fig. 10 the plastics pipe end 12 is fitted (before insertion into the pipe coupling or fitting 8) with a rigid support sleeve 21 having a locating flange 22.

## 90 CLAIMS

1. Means enabling a plastics pipe to be used with a coupling or fitting normally using a compression joint comprising a sealing member consisting of a deformable outer ring component and an inner elastomeric ring component, with the outer ring component initially shaped to form an axial cross-section concave towards the axis of the ring, and with the elastomeric ring component extending radially inwards from the outer ring component at least at its radial mid-plane at least as far as the projected surface of revolution between the rims of the deformable outer ring component, which rims have an internal diameter not less than the outside diameter of the plastics pipe.
2. A sealing member as in Claim 1, wherein the elastomeric ring component extends radially inwards beyond the projected surface of revolution between the rims of the deformable outer ring component.
3. A sealing member as in Claim 1 or Claim 2, wherein the deformable outer ring component is symmetrical about its radial mid-plane.
4. A sealing member as in any one of Claims 1 to 3, wherein the deformable outer ring component is formed of metal, or of rigid plastics material and the inner elastomeric ring component fills the space between the inside surface of the metal or rigid plastics ring and the projected surface of revolution between its rims.
5. A sealing member as in any one of Claims 1 to 3, wherein the inner elastomeric ring component lines the inside surface of the metal or rigid plastics ring and has a central lip or lips only extending radially inwards beyond the projected surface of revolution between the rim of the metal or rigid plastics

ring.

6. A sealing member as in Claim 4 or  
Claim 5, wherein the inner elastomeric ring  
component is bonded to the inside surface of  
5 the metal or rigid plastics ring.

7. A sealing member as in any one of  
Claims 4 to 6, wherein the deformable outer  
ring component is formed of copper or other  
ductile metal.

10 8. A sealing member as in any one of  
Claims 4 to 7, wherein the inner elastomeric  
ring is formed of peroxide cured ethylene  
propylene diene methylene or ethylene propy-  
lene terpolymer, or silicone rubber.

15 9. A sealing member as in any one of  
Claims 1 to 3, wherein the deformable outer  
ring component is formed of metal or rigid  
plastics material having an inwardly facing  
groove forming a housing for the inner elas-  
20 tomeric ring component.

10. A sealing member as in Claim 9,  
wherein the inner elastomeric ring component  
is a rubber O-ring.

11. A sealing member as in Claim 9 or  
25 Claim 10, wherein the groove is between two  
cylindrical surfaces, and the outside of the  
outer ring component is a short central cylin-  
drical surface between the larger diameter  
ends of a pair of opposed frusto-conical sur-  
30 faces.

12. A pipe coupling or fitting provided  
with a sealing member as in any one of  
Claims 1 to 11.

13. A sealing member for use in a pipe  
35 coupling or fitting and substantially as herein-  
before described with reference to any one of  
Figs. 1, 4 or 7.

14. A pipe coupling or fitting provided  
with a sealing member substantially as herein-  
40 before described with reference to any one of  
Figs. 2, 5 or 8.

15. A pipe coupling or fitting provided  
with a sealing member and secured and  
sealed to a plastics pipe substantially as here-  
45 inbefore described with reference to any one  
of Figs. 3, 6, 9 or 10.

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